What is claimed is:

1. A method for estimating a propensity of a vehicle to rollover, the method comprising the steps of:

determining lateral kinetic energy of said vehicle in response to vehicle longitudinal velocity and vehicle side slip angle;

measuring a lateral acceleration of said vehicle; and

determining a rollover potentiality index in response to said lateral kinetic energy and said lateral acceleration.

2. A method for detecting a rollover event of a vehicle, the method comprising the steps of:

determining lateral kinetic energy of said vehicle in response to vehicle longitudinal velocity and vehicle side slip angle;

measuring a lateral acceleration of said vehicle;

determining a rollover potentiality index in response to said lateral kinetic energy and said lateral acceleration;

determining a rollover index by weighting said rollover potentiality index by a factor of said lateral acceleration; and

determining if said rollover index is above a predetermined threshold.

3. The method of claim 2, wherein said vehicle longitudinal velocity is determined by monitoring wheel speed sensors.

4. The method of claim 2 wherein said vehicle side slip angle is determined by monitoring a yaw rate of said vehicle, a lateral acceleration of said vehicle, a steering wheel angle of said vehicle, and a vehicle dynamic model.

5. The method of claim 2 wherein said lateral acceleration is determined by monitoring an accelerometer.

6. The method of claim 2 wherein said rollover event comprises a condition wherein a corrective action is taken to counteract an actual rollover.

7. The method of claim 2 further comprising a control action for changing at least one operating parameter of said vehicle in response to detecting said rollover event to counteract an actual rollover from occurring.

8. The method of claim 7 wherein said control action comprises a torque reduction applied to at least one wheel of said vehicle in response to said control action.

9. The method of claim 8 wherein said torque reduction comprises an actuation of a brake.

10. The method of claim 7 wherein said torque reduction comprises a change in said engine output.

11. The method of claim 7 wherein said control action comprises an automated steering adjustment.

12. The method of claim 7 wherein said control action comprises an automated suspension adjustment.

13. The method of claim 2 wherein said rollover potentiality index is represented by the formula:

$$\Phi_0 = \frac{1}{2}|V_x\ \beta|^2 - \sqrt{g^2 + a_{ym}^2}\sqrt{d^2 + h^2} + d\,a_{ym} + h\,g\ ,$$

where V_x is said vehicle longitudinal velocity, β is said vehicle side slip angle, g is a gravity constant, a_{ym} is said measured lateral acceleration, d is one half a vehicle track width, and h is a nominal center of gravity height.

14. The method of claim 6 wherein said rollover index is represented by the formula:

$$\Phi = \Phi_0 \times (|a_{ym}| - \frac{d}{h} g \times 0.8 > 0)\ .$$

15. A system for estimating a propensity of a vehicle to rollover, the system comprising:
at least one wheel sensor for measuring the vehicle longitudinal velocity;
a yaw rate sensor;

a lateral acceleration sensor;

a steering wheel sensor;

a vehicle specific dynamic model; and

a controller for determining a side slip angle and for determining a rollover potentiality index in response to weighting said rollover potentiality index by a factor of a measured lateral acceleration for determining a rollover index.

16. The system of claim 15 wherein said lateral acceleration sensor comprises an accelerometer.

17. The system of claim 15 further comprising a control action for changing at least one operating parameter of said vehicle in response to detecting said rollover event to prevent an actual rollover from occurring.

18. The system of claim 17 wherein said at least one operating parameter comprises a torque reduction of said engine output.

19. The system of claim 17 wherein said at least one operating parameter comprises a torque reduction of at least one wheel.

20. The system of claim 19 wherein said torque reduction comprises an actuation of a brake.

21. The system of claim 17 further comprising an automated steering adjustment system for adjusting said at least one operating parameter.

22. The system of claim 17 further comprising an automated suspension adjustment system for adjusting said at least one operating parameter.

23. The system of claim 15 wherein said rollover potentiality index is represented by the formula:

$$\Phi_0 = \frac{1}{2}|V_x \beta|^2 - \sqrt{g^2 + a_{ym}^2}\sqrt{d^2 + h^2} + d\,a_{ym} + h\,g\,,$$

where V_x is said vehicle longitudinal velocity, β is said vehicle side slip angle, g is a gravity constant, a_{ym} is said measured lateral acceleration, where d is one half a vehicle track width, and h is a nominal center of gravity height.

24. The method of claim 23 wherein said rollover index is represented by the formula:

$$\Phi = \Phi_0 \times (|a_{ym}| - \frac{d}{h} g \times 0.8 > 0).$$